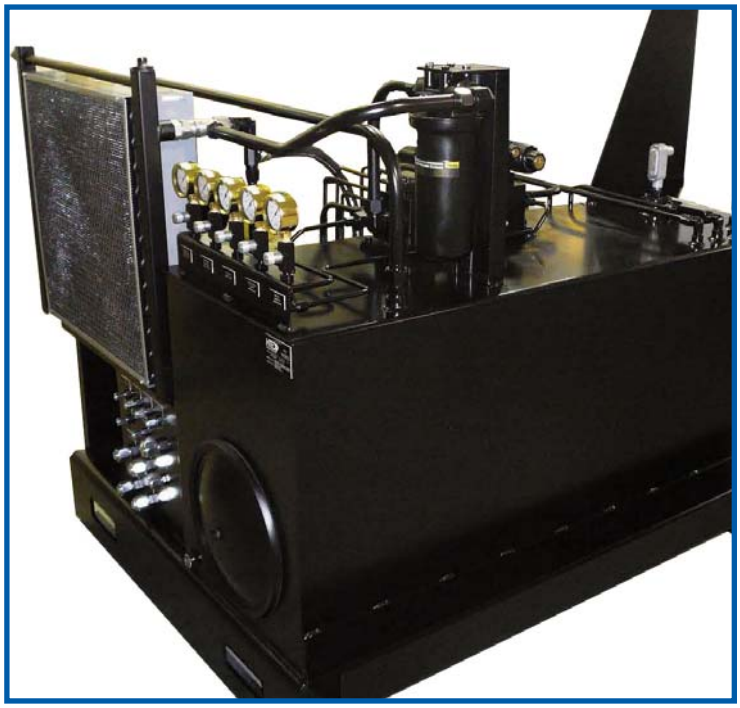
Quick Reference Technical Guide



for

HTE Hydraulic Unit

Model: HTG1200 (Rev. 3)

READ THE FOLLOWING INSTRUCTIONS THOROUGHLY AND CAREFULLY BEFORE UNPACKING, INSPECTING, OR INSTALLING THE HTE1200 HYDRAULIC UNIT.

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"HTE & THE HTE LOGO IS A REGISTERED TRADEMARK OF HTE TECHNOLOGIES"

SUNNEN® PRODUCTS COMPANY • 7910 MANCHESTER ROAD • ST. LOUIS, MO 63143, U.S.A. • PHONE: 314-781-2100

SAFETY INSTRUCTIONS

READ FIRST

This machine, like any equipment, may be dangerous if used improperly. Please read all warnings and instructions before attempting to use this machine.

Always disconnect power at main enclosure before servicing machine.[1]

Always wear eye protection when operating this machine.

NEVER open or remove any machine cover or protective guard with power "ON." Always disconnect power at main enclosure before servicing this equipment.[1]

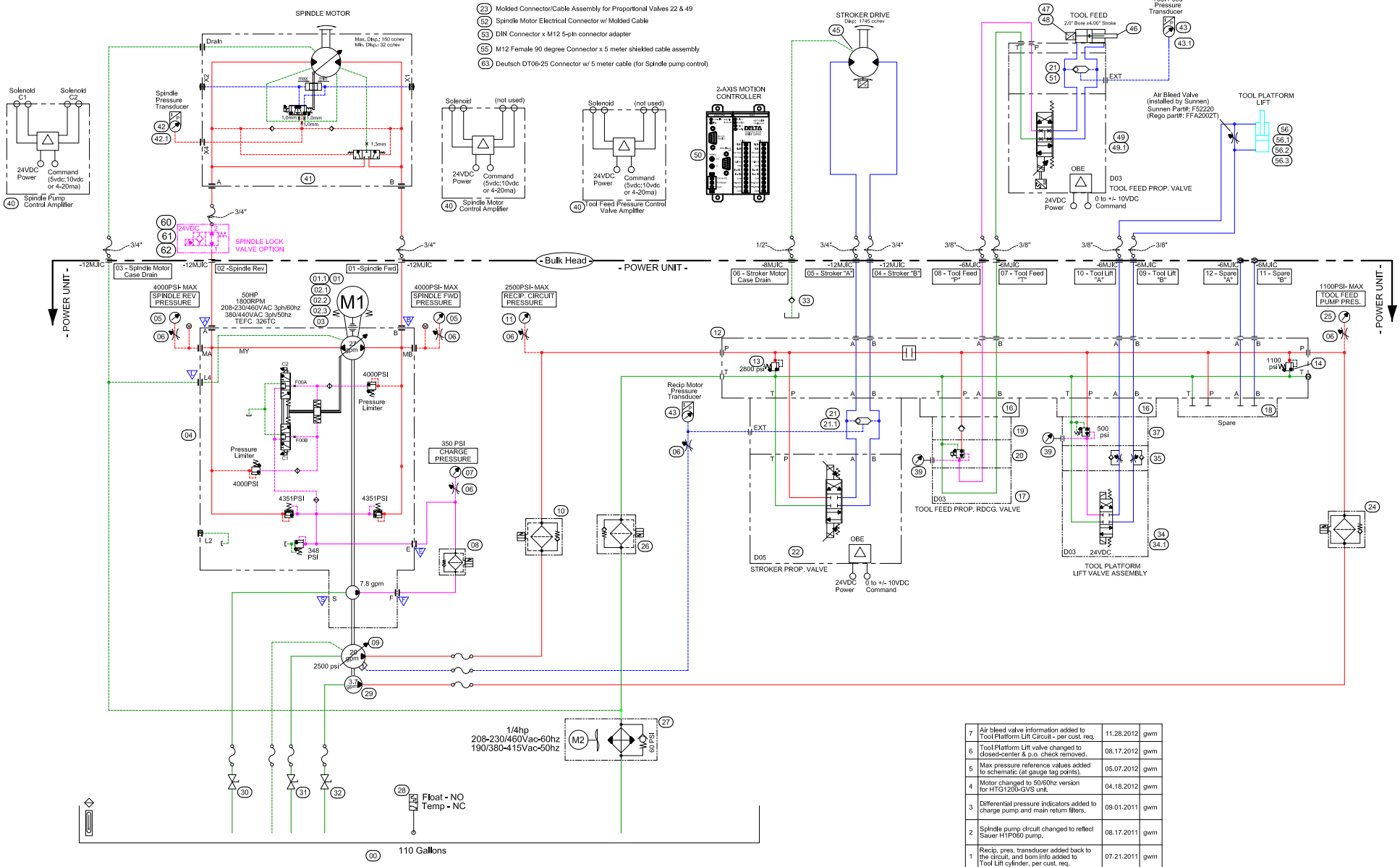
DO NOT attempt any repair or maintenance procedure beyond those described in this book. Contact your Sunnen® Field Service Engineer or Technical Services Representative for repairs not covered in these instructions.

Due to the wide variety of machine configurations, all possibilities cannot be described in these instructions. Instructions for safe use and maintenance of optional equipment ordered through Sunnen, will be provided through separate documentation and/or training provided by your Sunnen Field Service Engineer or Technical Services Representative.

DO NOT attempt to defeat any safety device on this machine or on any of the optional equipment.

If specially built automation components are added to this system, be sure that safety is not compromised. If necessary, obtain special enlarged work area safety system from Sunnen Products Co.

[1] DO NOT touch electrical components until main input power has been turned off and *CHARGE* lamps are extinguished. WARNING: The capacitors are still charged and can be quite dangerous.



rev	description	date	by
7	Air bleed valve information added to Tool Platform Lift Circuit - per cust. req.	11.28.2012	gwm
6	Tool Platform Lift valve changed to closed-center & p.o. check removed.	08.17.2012	gwm
5	Max pressure reference values added to schematic (at gauge tag points).	05.07.2012	gwm
4	Motor changed to 50/60hz version for HTG1200-GVS unit.	04.18.2012	gwm
3	Differential pressure indicators added to charge pump and main return filters.	09.01.2011	gwm
2	Spindle pump circuit changed to reflect Sauer H1P060 pump.	08.17.2011	gwm
1	Recip. pres. transducer added back to the circuit, and bom info added to Tool Lift cylinder, per cust. req.	07.21.2011	gwm

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HTE TECHNOLOGIES - 2021 Congressional Drive - St. Louis, Mo 63146 - U.S.A.

DATE: 07.08.2011

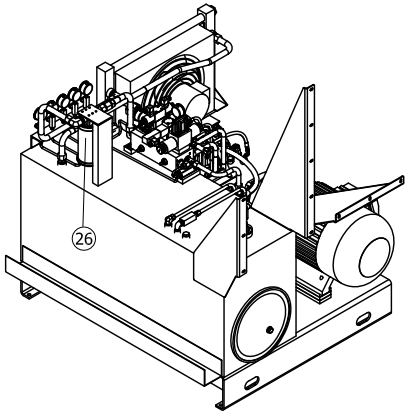
DWN BY: gwm

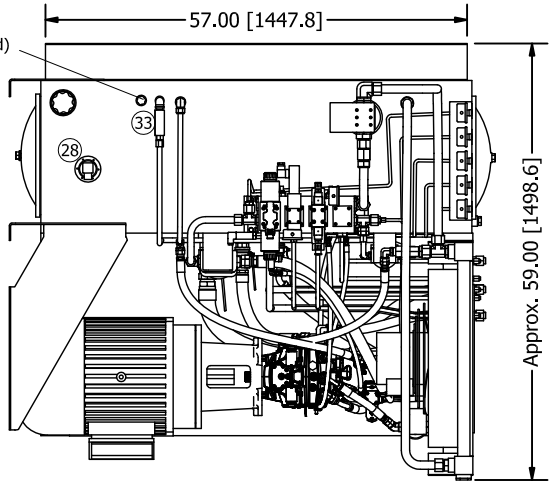
Sunnen - St. Louis, MO

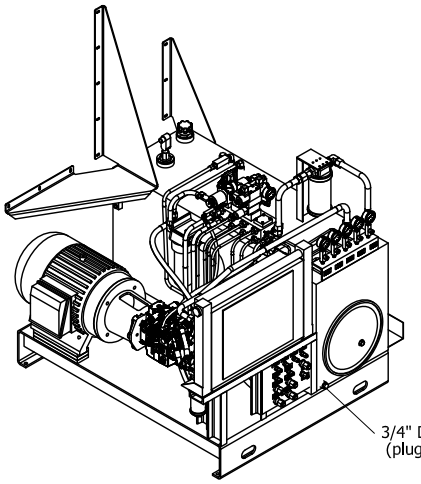
HTG1200-GVS Hydraulic Unit
Production Unit - Hydraulic Schematic

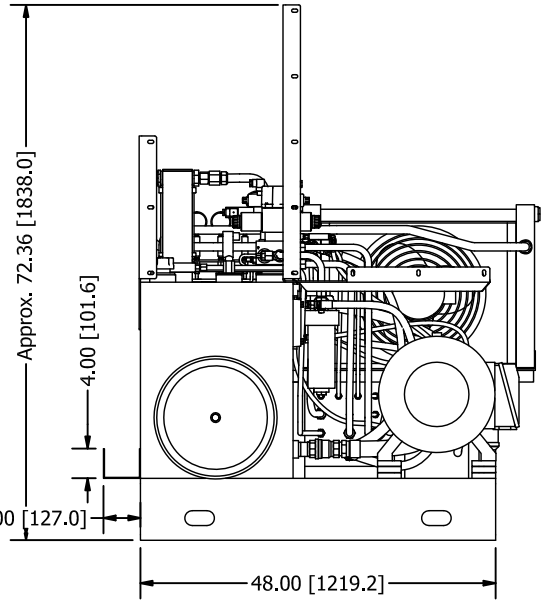
SIZE	FSCM NO.	DWG NO.	REV
		S5440-10GM0115H	7

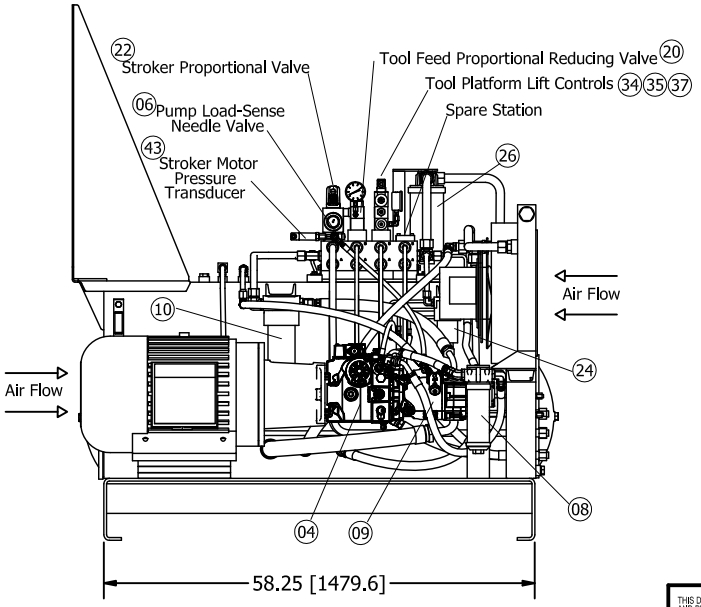
SCALE | SHEET

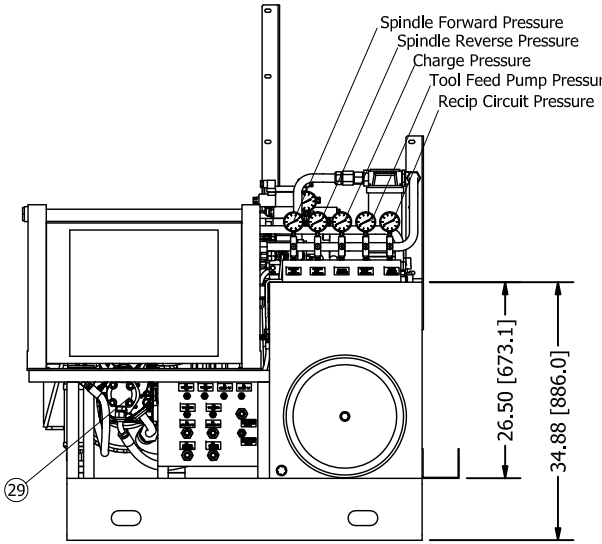












rev	description	date	by
2	Modifications to Tool Platform Lift valve stack configuration.	08.17.2012	GWM
1	Dwg chgd. to reflect use of Sauer-Danfoss pump.	09.08.2011	GWM

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HTE TECHNOLOGIES 2021 CONGRESSIONAL DRIVE ST. LOUIS, MO 63146

HTE TECHNOLOGIES

08.05.2011

DWN BY: GWM

Sunnen Products Company

HTG Hydraulic Unit
Production Unit - Hydraulic Schematic

SIZE B | FSCM NO. | DWG NO. S5440-10GM0115L | REV 2

SCALE | SHEET

Recommended
Spare Parts = ******

Hydraulic Power Unit Assembly - SUNNEN PART#: HTG-1200					
BOM#	***Qty***	***Vendor Part Number***	***Description***	***Vendor***	***Sunnen #***
00	1		Custom 110 Gallon L-shape Reservoir w/ Welded Top.	Vescor/LDI	HTG-1101
01	1	12C052X278G4	50hp 1750rpm 230/460 TEFC 3ph/50-60hz 326TC Motor	Baldor	PMO1021
01.1	1	MDB326W	Motor Isolation Mount (1 set)	Magnaloy	PHM-649
02.1	1	M500-20416-DSS	2-1/8" X 1/2"KW Coupling - Motor	Magnaloy	PHM-650
02.2	1	M500-B2116C	21 Tooth Spline Coupling w/ 1.375" major diameter & clamp style w/ steel bushing configuration	Magnaloy	PHM-651
02.3	1	M570H5	Coupling Insert (Hytrel)	Magnaloy	PHM-652
03	1	M324762C	Pump-Motor Adapter	Magnaloy	PHM-653
04	1	H1P060RBA3C2ND8HF 1H5L30L30CP20N NNNNNN	Sauer 3.69 cir/ SAE-C 4-bolt; CW rotation;1" code 62 ports w/ M12 threads; -16 charge pump suction; -10 charge pump outlet; -12 case drain; 21T 16/32 DP spliined shaft (1-3/8"); 1.03 cir charge pump	Sauer-Danfoss	PFC-294
05	2	PFQ812	0-5000 psi 2.5" 1/4" LM Liquid Filled SS Gauge	Winters	PFC-248
06	6	N400S	Gauge Shut-Off Valve	Parker	PFC-249
07	1	PFQ808	0-600 psi 2.5" 1/4" LM Liquid Filled SS Gauge	Winters	PFC-250
08	1	12CS205QEBMKS121	Charge Pump Filter	Parker	PFC-251
08.1	1	940764Q	Replacement Element - (for above)	Parker	PFC-251-1
09	1	PD045PS01SRS5AL00T0 0A0000	2.75 cir; SAE-B 2 bolt mount; 15Tooth Spline Shaft; CW rotation; 1.5" code 61 suction; 1" code 61 pressure; -10 case drain; SAE-A 2 bolt 9-tooth thru drive; load sense compensator	Parker	PFC-252
10	1	WPF3 05QE V M2 K S16 1	Pressure Filter - Stroker Circuit	Parker	PFC-253
10.1	1	941036Q	Replacement Element - (for above)	Parker	PFC-253-1
11	1	PFQ811	0-3000 psi 2.5" 1/4" LM Liquid Filled SS Gauge	Winters	PFC-254
12	1	AD05HP043S/CPAD	D05 High Capacity 4-station Manifold w/ P-port isolation and Dual Relief Cavities	Daman	PFC-255
13	1	RAH101S30	Relief Valve Cartridge (200-3000 adj. range)	Parker	PFC-256
14	1	RAH101S20	Relief Valve Cartridge (100-2000 adj. range)	Parker	PFC-257
15	0	0	(deleted)		
15.1	0	0	(deleted)		
16	2	AD03D05VAAB	D05 TO D03 Valve Adapter (1.50")	Daman	PFC-258
17	1	AD03COP	D03 Cross-Over Plate (.75")	Daman	PFC-259
18	1	AD05CPP	D05 Cover Plate	Daman	PFC-260
19	1	CM**2**PPN	D03 P-port Check Valve Module	Parker	PFC-261
20	1	PRPM2PP10KV	Proportional Pressure Reducing Module	Parker	PFC-262
21	1	CSAA-EXN	Shuttle Valve Cartridge	Sun	PFC-263

21.1	1	DBS	D05 Shuttle Valve Sandwich Body (1.18")	Sun	PFC-264
22	1	D3FBE01SCONF00	Proportional Valve w/ On-board Electronics	Parker	PFC-265
23	0		(see "shipped loose" items)	TSII	
24	1	WPF1 05QE V M2 K S08 1	Pressure Filter - Tool Feed Circuit	Parker	PFC-266
24.1	1	941030Q	Replacement Element - (for above)	Parker	PFC-266-1
25	1	PFQ810	0-2000 psi 2.5" 1/4" LM Liquid Filled SS Gauge	Winters	PFC-267
26	1	50CS110QEBMKS201	Return Filter	Parker	PFC-268
26.1	1	940818Q	Replacement Element - (for above)	Parker	PFC-268-1
27	1	AOC-33-2-60-3PH	Air-to-Oil Heat Exchanger w/ 60psi bypass and air filter	Thermal Transfer	PFC-270
28	1	B40030AFD2C758	Temp/Level Switch	ACT	PES-828
29	1	PGP505A0080CA1H2N D5D4B1B1 (3319111482)	8cc/rev (0.49cir) Gear Pump (SAE-A 2-bolt; 9-tooth spline; -12 inlet; -10 outlet)	Parker	PFC-271
30	1	2BVL-20-16FL	1" NPT Suction Ball Valve w/ Lockable Handle	Stauff	PFC-272
31	1	2BVL-20-24FL	1.5" NPT Suction Ball Valve w/ Lockable Handle	Stauff	PFC-273
32	1	2BVL-20-12FL	3/4" Suction Ball Valve w/ Lockable Handle	Stauff	PFC-274
33	1	C800S	1/2" Parker Check Valve	Parker	PFC-275
-	1	***	Fabricated Bulkhead & Gauge Panel	HTE	
34	1	D1VW001CNJW	Directional Control Valve (24vdc)	Parker	PFC-276
35	1	FM2DDDSN	Dual Flow Control Module	Parker	PFC-277
36	0		(deleted)	Parker	PFC-278
37	1	PRDM2PP06SNS	Pressure Reducing Module (22 - 928 psi adjustment range)	Parker	PFC-279
38	0		(deleted)		
39	2	PFQ816	0-1500 psi 2.5" 1/4" LM Liquid Filled SS Gauge	Winters	PFC-280
40	0		(see "shipped loose" items)		
43	1	LE33000	Pressure Transmitter (0-3000 psi) 2-wire 4-20ma output w/ 12-36vdc excitation voltage input	Winters	PFC-284

continued on next page

Shipped Loose Items - (will be ordered as individual line items by Sunnen)

BOM#	Qty	Vendor Part Number	Description	Vendor	Sunnen #
21	1	CSAA-EXN	Shuttle Valve Cartridge	Sun	PFC-263
23	2	7M7-R10-ST	Mil-Spec Cable Assemblies for Proportional Valves	TSII	CBL-969
40	3	LEPDX	Amplifier Module (Spindle motor and pump, and for Tool Feed pressure control valve)	Lynch	PED-2814
41	1	V14-160-SVSEPH-3-N-L013-N-00-160/032/200 (3785704)	160cc/rev; SAE-D 4-bolt; 1.25 code 62 ports; -12 st. thread drain port; electro-hydraulic control; -6 sae st. thread X4 port	Parker	PFC-282
42	1	LE35000	Pressure Transmitter (0-5000 psi) 2-wire 4-20ma output w/ 12-36vdc excitation voltage input	Winters	PFC-283
42.1	1	6-1/4 F5OG-S	-6 st. thread x 1/4" NPT adapter (for connection of transducer to motor X4 port)	Parker	F2996
43	1	LE33000	Pressure Transmitter (0-3000 psi) 2-wire 4-20ma output w/ 12-36vdc excitation voltage input	Winters	PFC-284
43.1	1	4-1/4 F5OG-S	-4 female NPT x -4 male SAE oring adapter (for connection of transducer to shuttle valve on Tool Feed circuit)	Parker	PPP-790
45	1	10M22 F80MX-S	-10 37deg swivel x 22x1.5 male metric ORR Adapter (for motor case drain)	Parker	F46714
46	1	2.00"J2HXFTS14Ax4.00 2HX code: BGCNB1N prepared to accept Balluff Transducer BTL5-S102B-M0102-Z-32	Tool Feed Cylinder (2.00" bore x 4.00" stroke; MF1 mount; 1" rod; 3/4"-16 male rod thread; -10 st. thread ports; low friction piston and rod seals; with cap-end mount for D03 proportional valve	Parker	PFC-285
47	1	BTL7-S502B-M0102-Z-S32	Balluff Transducer	Balluff	PEM-1235
48	1	BKS-S 33M-05	Cable for Balluff Transducer	Balluff	CBL-970
49	1	D1FPE50FA9NB00	Proportional Valve w/ On-board Electronics 0 to +/-10vdc control; 24vdc power	Parker	PFC-286
49.1	4	23154	10-24 x 2.50" Grade 8 SHCS	Fastenal	
50	1	RMC75P-MA2	Delta Controller - Profibus Protocol and MA2 Module	Delta	PED-2813
51	1	GBS	D03 Shuttle Valve Sandwich Body	Sun	PFC-287
52	1	7000-70061-7500300	Junior Timer valve molded cable assembly	Sun	CBL-971
53	8	7000-41441-0000000	DIN form A x M12 (5 pin) connector	Murr	CBL-972
54	0	(deleted)	(deleted)		
55	3	7000-13281-3490500	M12 female 90 degree connector x 5 meter shielded cable	Murr	CBL-973

continued on next page

Shipped Loose Items - (continued)					
BOM#	***Qty***	***Vendor Part Number***	***Description***	***Vendor***	***Sunnen #***
56	1	1.00J3LATS23Ax1.50	Tool Jack Cylinder (KK= M10 x 1.5-male; A=1.25"; LA = 1.875"; cylinder prepped for limit switch; switch at cap end; aluminum body)	Parker	PFC-290
56.1	1	P8S-GRSHX	Reed switch	Parker	PES-829
56.2	1	P8S-TMA0X	Switch mounting bracket	Parker	PHM-654
56.3	1	086620T005	Cord set w/ Nano Connector (5 meter cable)	Parker	CBL-974
63	2	DT06-25-PW15K	Deutsch DT06-25 connector w/ 15 foot cord (for pump control)	TSII	CBL-977
77	5	7000-13221-3490500	M12, Female Straight Shielded Cable, Pur-JB 5 x 10; 24 Shielded, Grey, 5M	Murr	CBL-1070

Spindle Lock Option - Valve Addition					
60	1	GS061800N	N.O. Cartridge Valve	Parker	PFC-288
61	1	CCP024D	Coil - 24vdc - DIN Electrical Connection	Parker	PEM-1236
62	1	B16-2-16T	Valve Body (-16 ports)	Parker	PFC-289
62.1	1	12-16 F65OX-S	-12 female JIC swivel x -16 male st. thread adapter (valve outlet- port #1)	Parker	PPP-791
62.2	1	12-16 C5OX-S	-12 male JIC x -16 male st. thread elbow adapter (valve inlet - port #2)	Parker	F4003

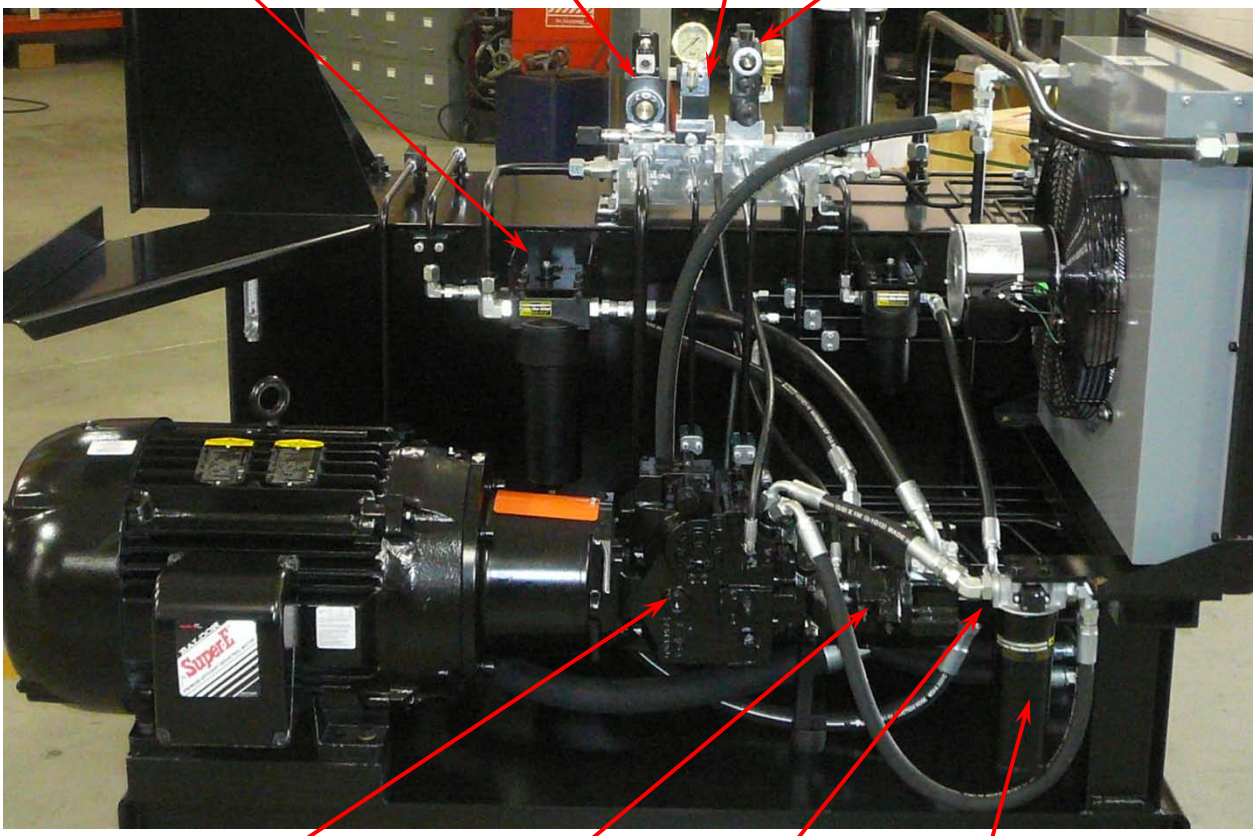
Misc Terminal Blocks, Jumpers, etc. - (ordered as indiviudal line items by Sunnen)				
70	155		Single 5mm Grey Terminal Block	Wago
71	100		Double Stacked, 5mm Grey Terminal Block	Wago
72	40		Single 5mm, Ground (Green) Terminal Block	Wago
73	20		Double Stacked, 5mm Ground (Green) Terminal Block	Wago
74	pkg		Single End Plates	Wago
75	pkg		Double End Plates	Wago
76	pkg		Jumpers	Wago

Stroker Circuit Pressure Filter (bom# 10)

Stroker Proportional Valve (bom# 22)

Tool Feed Proportional Pressure Control Valve (bom# 20)

Tool Platform Lift Control Valve (bom# 34)



Spindle Pump (bom# 04)

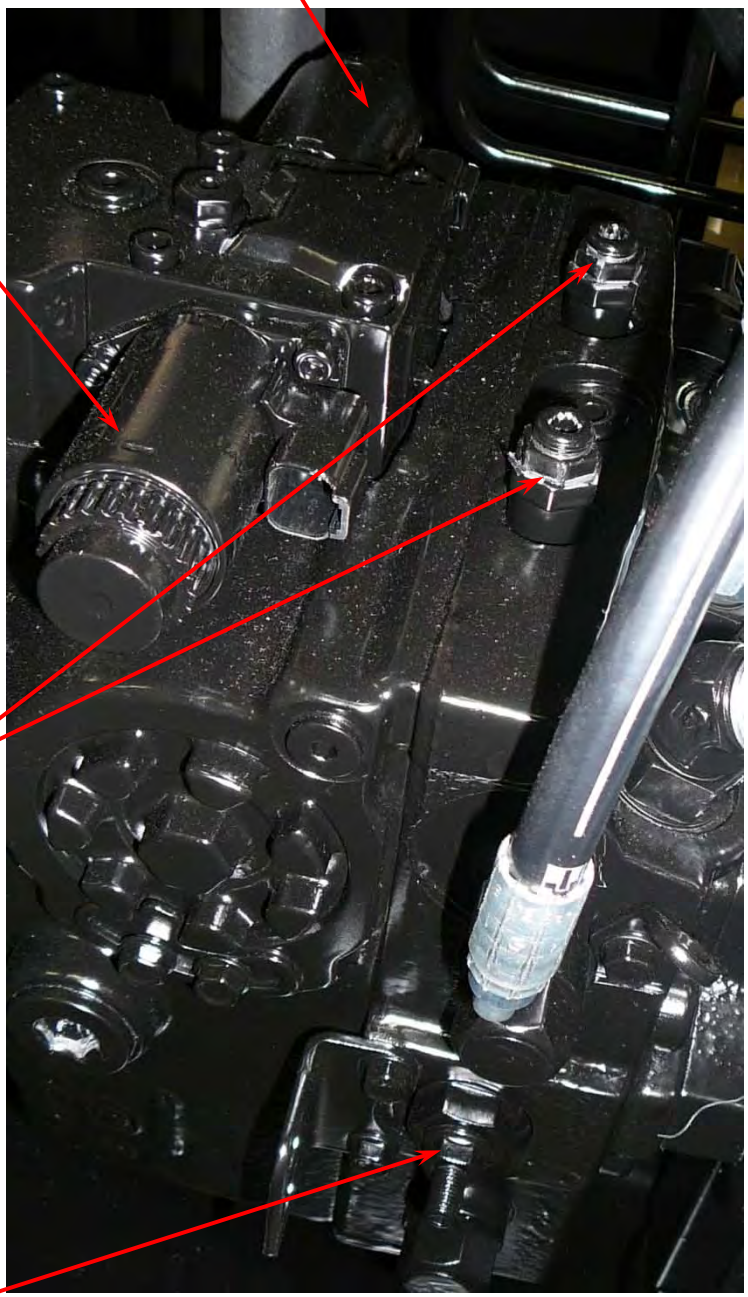
Recip Pump (bom# 09)

Tool Feed Pump (bom# 29)

Charge Pump Filter (bom# 08)

"C1" Spindle Pump
Control Solenoid
(REVERSE)

"C2" Spindle Pump
Control Solenoid
(FORWARD)



POR Valves were set at time
of initial unit testing. No further
adjustments should be required.
(Improper adjustment can result in system damage.)
(set @ 4000 psi)

Charge Pump Pressure Adj.
(Set @ 350 psi at time of initial testing.
No further adjustments should be required.)

Charge Pressure Relief Valve Adjustment

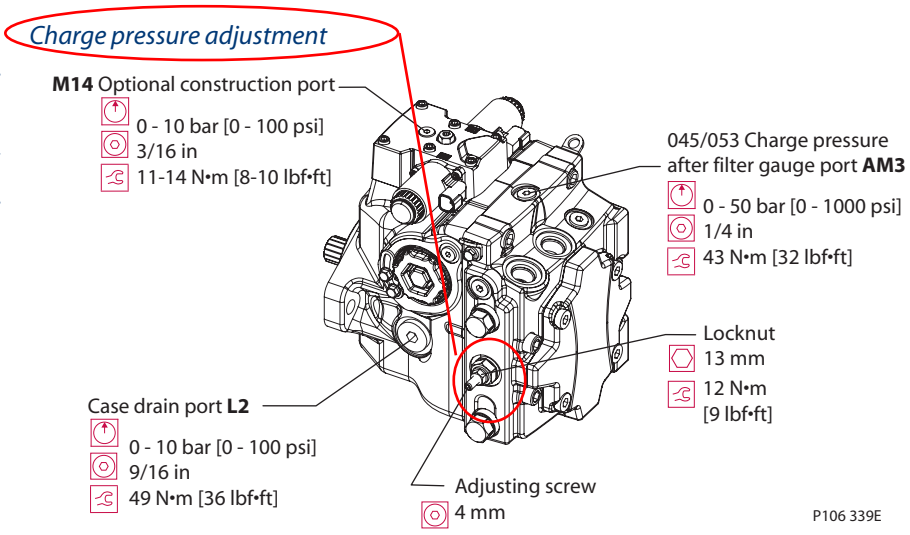
This procedure explains how to check and adjust the charge pressure relief valve.

1. Install a 50 bar [1000 psi] pressure gauge in charge pressure gauge port M3. Install a 10 bar [100 psi] gauge at case pressure port L2, or L4. Operate the system with the pump in neutral (zero displacement) when measuring charge pressure.

Ensure charge pressure is properly set before checking pressure limiter.

2. The table shows the acceptable pump charge pressure range for some nominal charge relief valve settings (refer to model code located on serial number plate). These pressures assume 1800 min^{-1} (rpm) pump speed and a reservoir temperature of 50°C [120°F], and are referenced to case pressure.

Other charge pressure relief valves are available. *See page 49* for torques and wrench sizes on other charge pressure relief valves.



Listed pressures assume a pump speed of 1800 min^{-1} (rpm) and charge flow of 26.5 l/min [7 US gal/min]. At higher pump speeds or higher charge flows the charge pressure will rise over the rated setting.

3. Rotate the adjusting screw clockwise to increase the setting; counter clockwise to decrease it. Subtract the case pressure reading to compute the actual charge pressure.

Charge pressure ranges

Model code	Actual charge pressure*
20	20 bar [290 psi] ± 1.5 bar [21.8 psi]
24	24 bar [348 psi] ± 1.5 bar [21.8 psi]
26	26 bar [377 psi] ± 1.5 bar [21.8 psi]
30	30 bar [435 psi] ± 1.5 bar [21.8 psi]

* This is the actual charge pressure port gauge reading minus the case pressure port gauge reading. Factory set at 1800 min^{-1} (rpm) with a reservoir temperature of 50° C [120° F].

Pressure change per turn is dependant on charge flow entering pump.

4. While holding the adjusting screw, torque locknut to 17 N•m [13 lbf•ft].

5. When you achieve the desired charge pressure setting, remove the gauges and plug the ports.

Pressure Limiter Adjustment

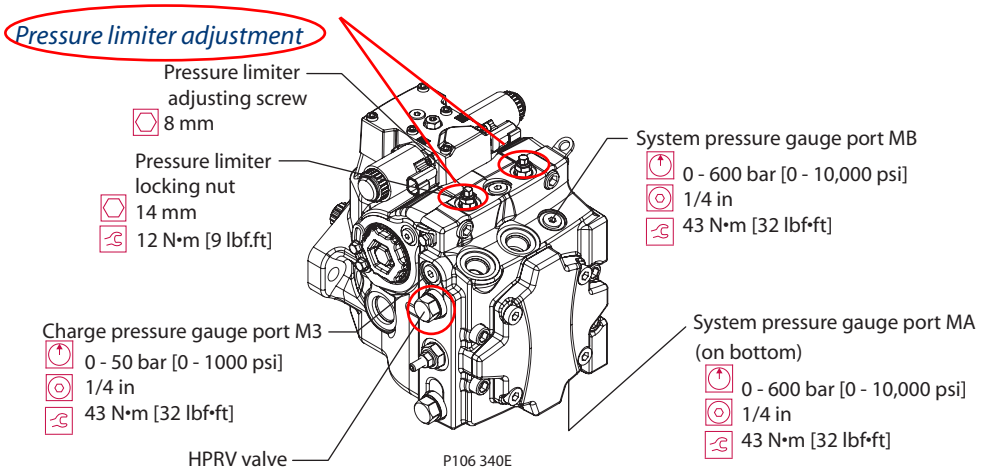
Lock motor output shaft to adjust the pressure limiter setting. Lock the vehicle's brakes or rigidly fix the work function so it cannot rotate.

Ensure charge pressure is properly set before checking pressure limiter.

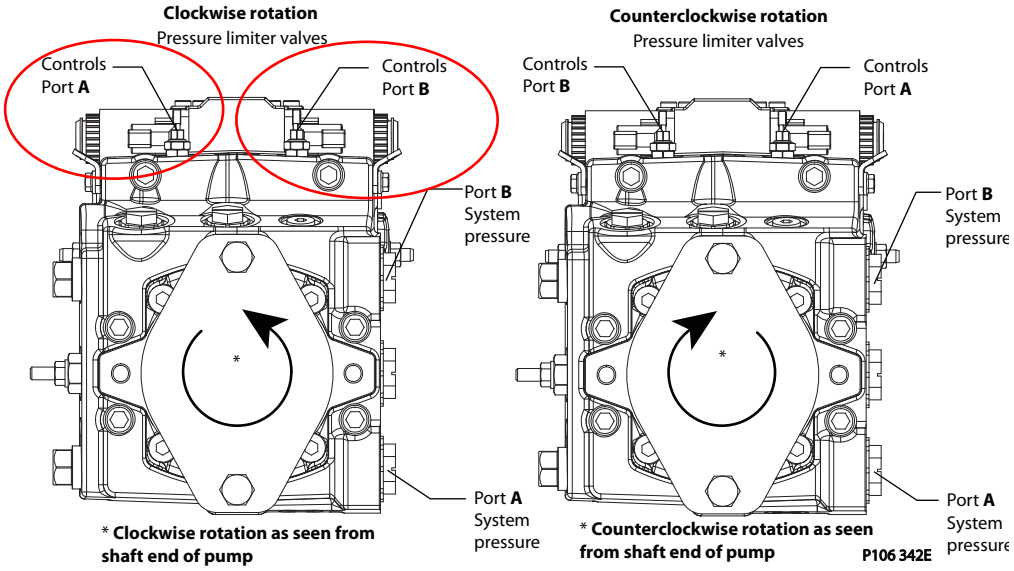
1. Install 600 bar [10,000 psi] pressure gauges in the high pressure gauge ports (MA and MB). Install a 50 bar [1000 psi] pressure gauge in the charge pressure gauge port (M3).

If you change pressure limiter settings, you must also change the HPRV valve to maintain proper PL function. Refer to table on next page for corresponding settings.

Pressure limiter adjustment


Pressure limiter adjusting screw
8 mm
Pressure limiter locking nut
14 mm
12 N•m [9 lbf.ft]
System pressure gauge port MB
0 - 600 bar [0 - 10,000 psi]
1/4 in
43 N•m [32 lbf•ft]
Charge pressure gauge port M3
0 - 50 bar [0 - 1000 psi]
1/4 in
43 N•m [32 lbf•ft]
System pressure gauge port MA (on bottom)
0 - 600 bar [0 - 10,000 psi]
1/4 in
43 N•m [32 lbf•ft]
HPRV valve
P106 340E

Pressure limiter valve adjustment


Clockwise rotation
Pressure limiter valves
Controls Port A
Controls Port B
Port B System pressure
Port A System pressure
* Clockwise rotation as seen from shaft end of pump
Counterclockwise rotation
Pressure limiter valves
Controls Port B
Controls Port A
Port B System pressure
Port A System pressure
* Counterclockwise rotation as seen from shaft end of pump
P106 342E

Endcaps are different for clockwise and counter clockwise rotation.

Pressure Limiter Adjustment (continued)

The model code on the serial plate gives the factory setting of the PL (Pressure Limiter). The PL setting is referenced to charge pressure. Subtract charge pressure from system pressure gauge readings to compute the effective PL setting.

2. Start the prime mover and operate at normal speed.
3. Use a 17mm wrench to loosen the locking nut (L024).
4. Activate the control input until pressure in the high side of the system loop stops rising. This pressure is the PL setting.
5. Return the pump to neutral and adjust the PL setting using an internal hex wrench. Wrench size is in the diagram on the previous page. Turn the adjusting screw clockwise to increase the PL setting, counter clockwise to decrease it. The adjustment is very sensitive. Change per turn is approximately 150 bar [2176 psi].

Change per turn is 150 bar/rev [2176 psi/rev].

6. Repeat steps four and five until you reach the desired PL setting. After adjustment, torque the locknut (L024) to 12 N•m [9 lbf•ft]. Do not over torque.
7. Shut down the prime mover. Remove gauges and replace plugs.

Pressure limiter settings

Pressure limiter setting	HPRV setting
150	200
180	230
200	250
230	280
250	300
280	330
300	350
330	380
350	400
380	420

Pressure limiter setting	HPRV setting
400	450
410	
420	
430	480
440	
450	
460	510
470	
480	

Spindle Motor - (Parker V14 Series)

EO, EP, HO and HP controls (general information)

Basically, these controls function in a similar way.

At increasing solenoid current (EP) or increasing pilot pressure (HP) the control moves towards the min displacement position.

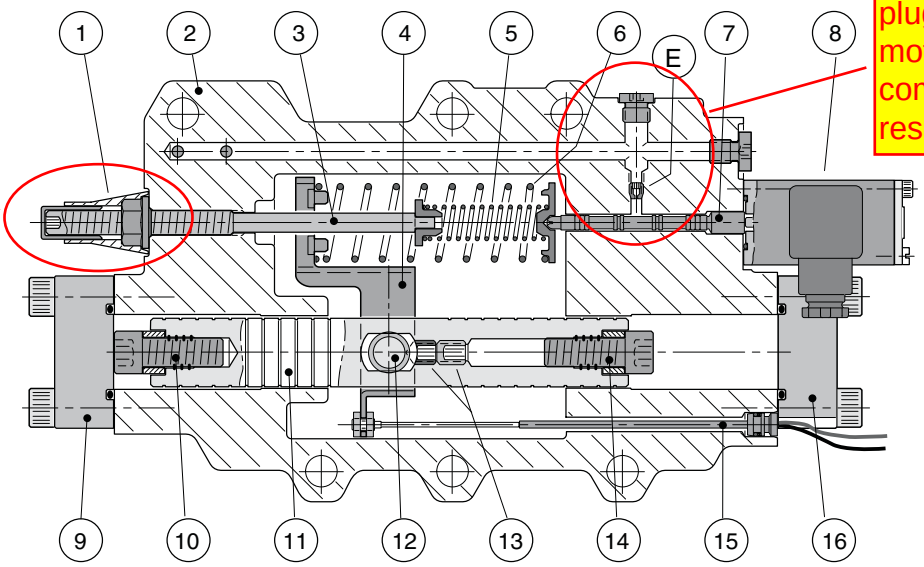
At decreasing current or pilot pressure, the control retracts towards max displacement.

In comparison with EP and HP, the EO and HO controls have no modulating spring; this means that only min and max displacements can be obtained with these controls.

Max and min displacements can be limited by a screw with spacer bushing as shown below.

DO NOT Adjust

If this orifice becomes plugged with debris, this motor will not respond to commands...or it will respond very slowly.



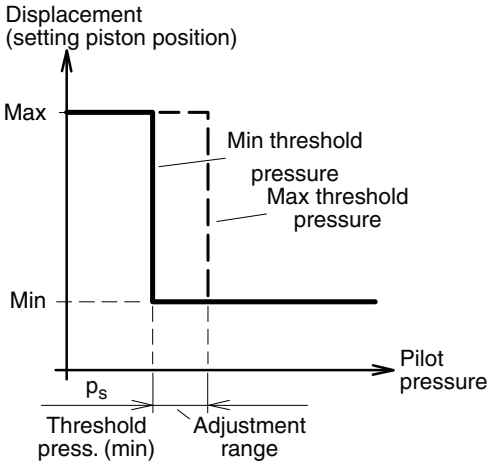
Cross section of the EP control module.

1. Two-part seal (threshold adjustm't)
2. Control module housing
3. Threshold adjustment screw
4. Feedback arm
5. Threshold spring
6. Modulating spring (EP, HP only)
7. Servo valve spool
8. Solenoid (EO, EP only); cover on HO, HP
9. End cover (max displ. limit)
10. Max displ. limiting screw/bushing
11. Setting piston
12. Connecting arm
13. Set screws
14. Min displ. limiting screw/bushing
15. Setting piston position sensor
16. End cover (min displ. limit)

E. Nozzle location; refer to the hydraulic schematics.

HO hydraulic two-position control

- The two-position HO control is similar to the EO (page 50) but the control signal is hydraulic. The position of the servo piston is governed by the built-in servo valve (same as on all controls).
- When the applied pilot pressure (port X5) exceeds the pre-set threshold value, the piston moves from the max to the min displacement position.
- Positions between max and min cannot be obtained with this control.
- The threshold pressure is factory set at 10 bar but is adjustable between 5 and 25 bar.



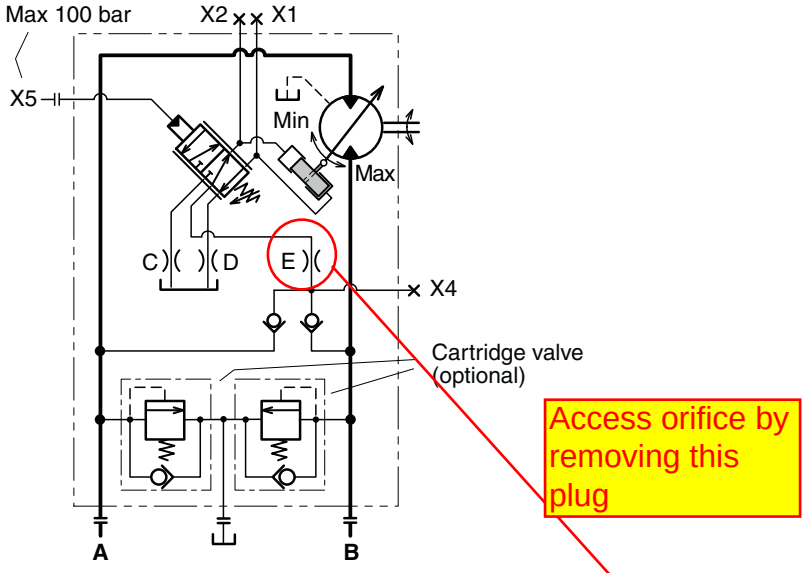
HO diagram (displacement vs. pilot pressure).

Gauge ports (HO and HP controls):

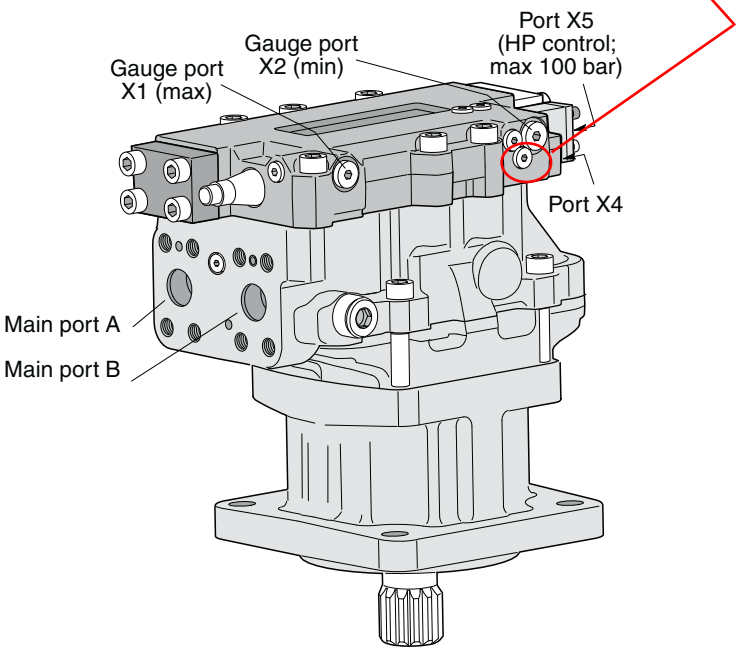
- X1 Setting piston pressure (decreasing displ.)
- X2 Setting piston pressure (increasing displ.)
- X4 Servo supply pressure (before orifice)
- X5 External pilot pressure (max 100 bar; HP control)

Port sizes:

- M14x1.5 (ISO version)
- $^{9}/_{16}$"-18 O-ring boss (SAE version).



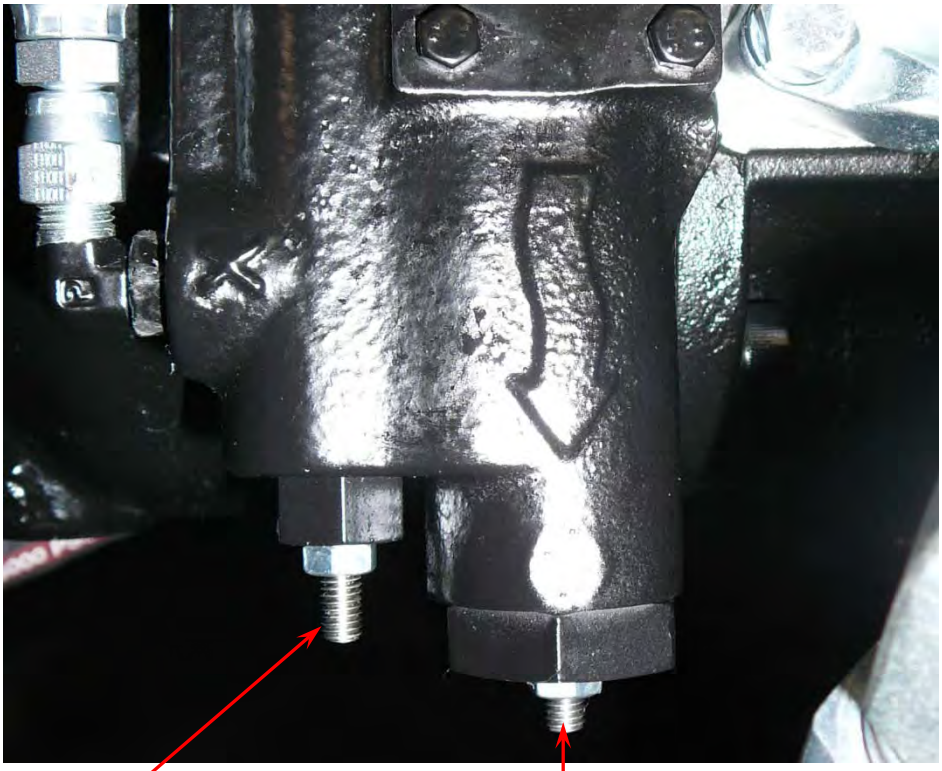
HO schematic (shown: port X5 not pressurized; control in max displ. position).



Port locations - V14-110 with HO or HP control.

Parker Hannifin
Pump and Motor Division
Trollhättan, Sweden

Stroker Pump Control Assembly



Differential Adjustment
(factory set @ 500 psi)
DO NOT ADJUST

Pressure Compensator Adjustment
(factory set @ 2500 psi)

IMPORTANT: This adjustment is utilized to set the maximum Stroker circuit operating pressure. It should ***ALWAYS*** be set at approx. 250 – 350 psi ***BELOW*** the Stroker circuit safety relief valve. Failure to follow this adjustment procedure will result in severe system overheating, and possible system damage.

IMPORTANT: The load sense signal valve was preset during initial testing, and locked in place utilizing the locking set-screw. The locking set screw will need to be loosened before making any adjustments. ***DO NOT*** adjust this valve unless advised to do so by Sunnen personnel. Improper adjustment can result in severe system instability.

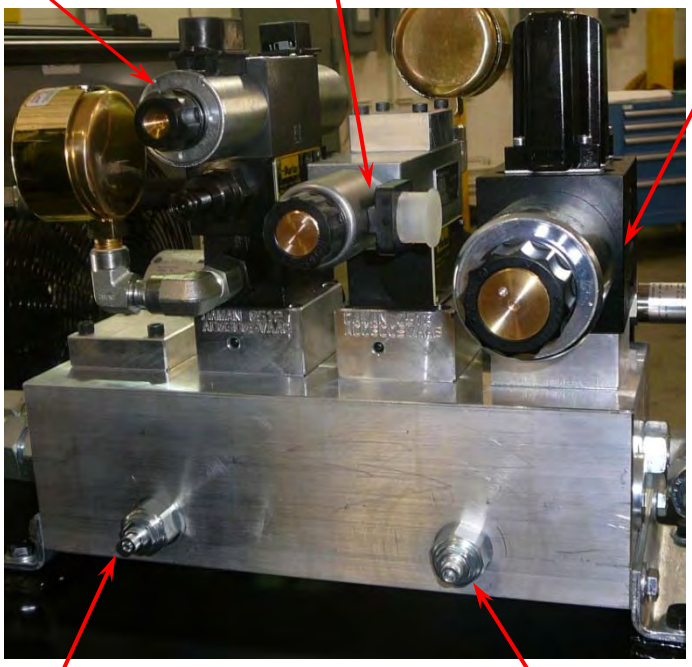
Locking Set-Screw

Load-Sense Needle Valve

Tool Platform Lift Valve (bom# 34)

Tool Feed Proportional Pressure Control Valve - (bom# 20)

Stroker Proportional Valve (bom# 22)



Tool Feed Circuit Relief Valve – (bom# 14)
(Factory Set @ 1100 psi)

Stroker Circuit Safety Relief Valve - (bom# 13)
(Factory Set @ 2800 psi- DO NOT ADJUST)

IMPORTANT: This is strictly a maximum system safety relief valve. **DO NOT** utilize this valve to set the operating pressure of the Stroker circuit. Use the pump compensator to set the maximum operating pressure of the Stroker circuit. This safety relief valve should ***AWAYS*** be set at approx. 250 – 350 psi ***ABOVE*** the Stroker circuit safety relief valve. Failure to follow this adjustment procedure will result in severe system overheating, and possible system damage.

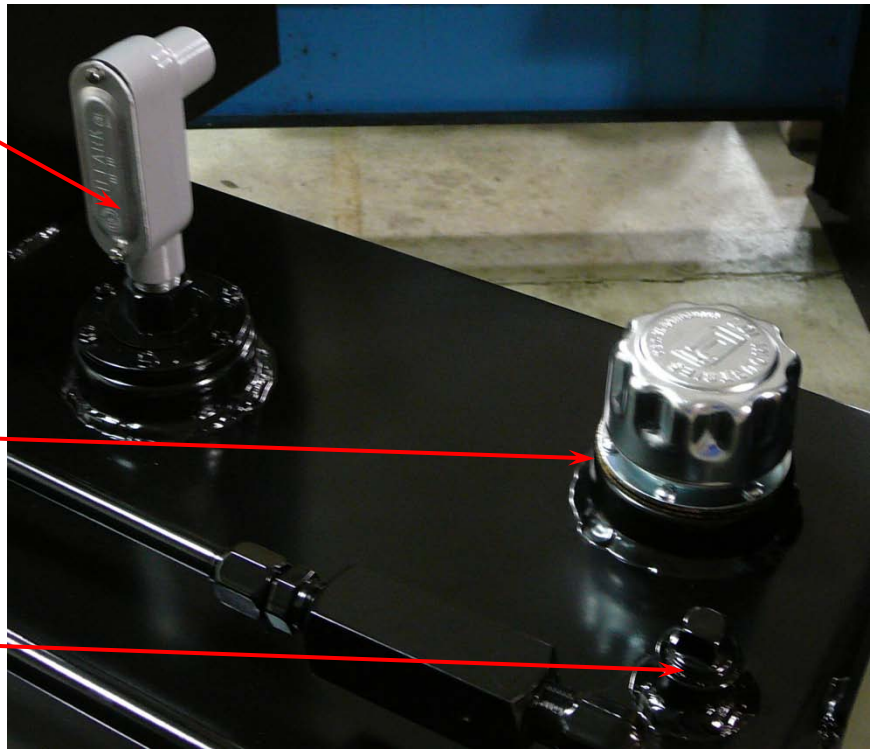
Customer Connection Bulkhead

Gauge Panel

Temp Level Switch – (bom# 28)

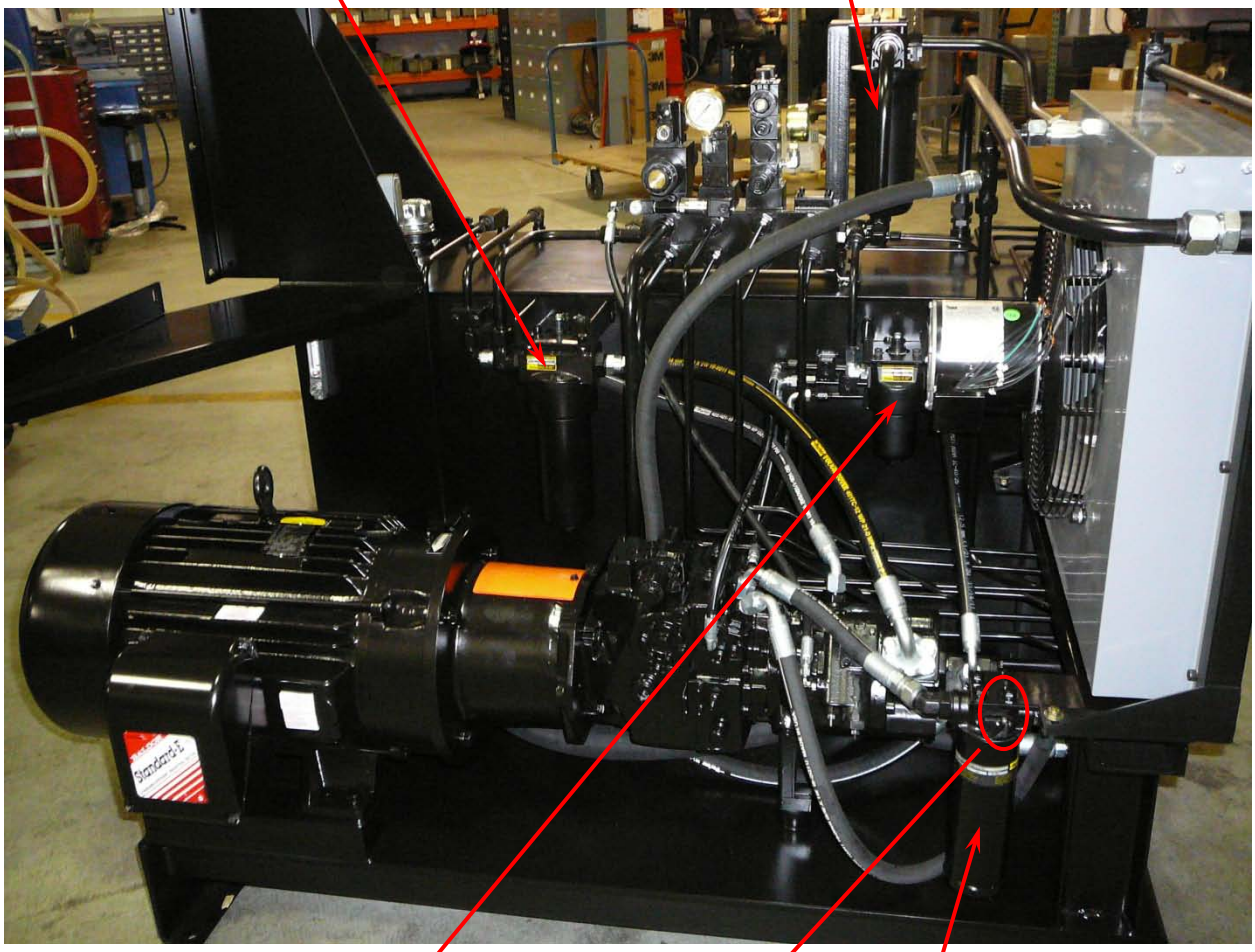
System Filler/Breather

Spare Return (plugged)



Stroker Circuit Pressure Filter
(bom# 10)
Replacement Element: Parker# 941036Q

Return Filter
(bom# 26)
Replacement Element# 940818Q



Tool Feed Circuit Pressure Filter
(bom# 24)
Replacement Element: Parker# 941030Q

Charge Circuit Pressure Filter
(bom# 08)
Replacement Element: Parker# 940764Q

LED will illuminate when filter needs to be serviced. (Push to test.)
(bom# 08 & bom#26 only)

Heat Exchanger Filter
Remove to clean

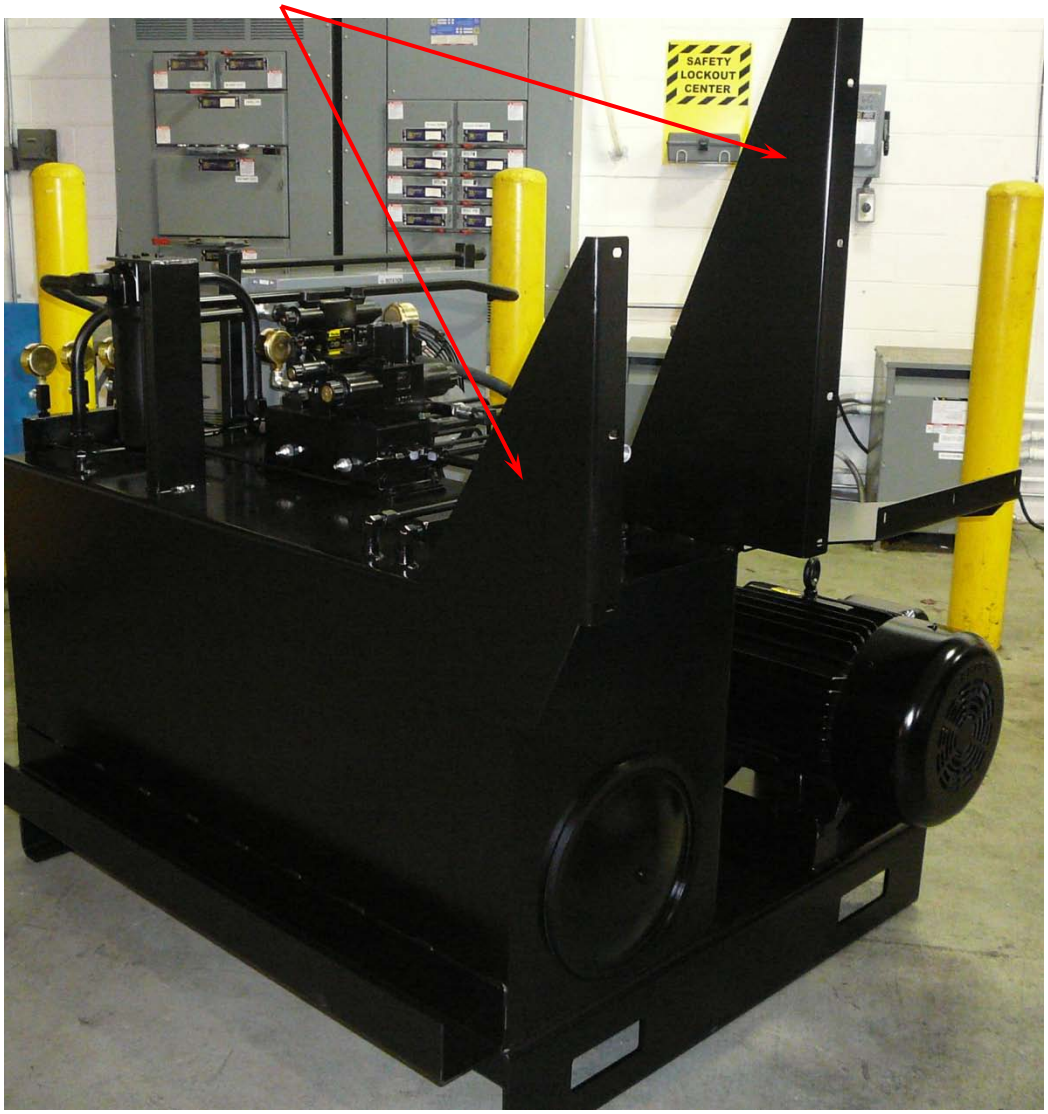
Gauge Panel

Customer Connection Bulkhead

Reservoir Access Cover
(two places)

Reservoir Drain Plug

Electrical Control Panel Mounting Brackets

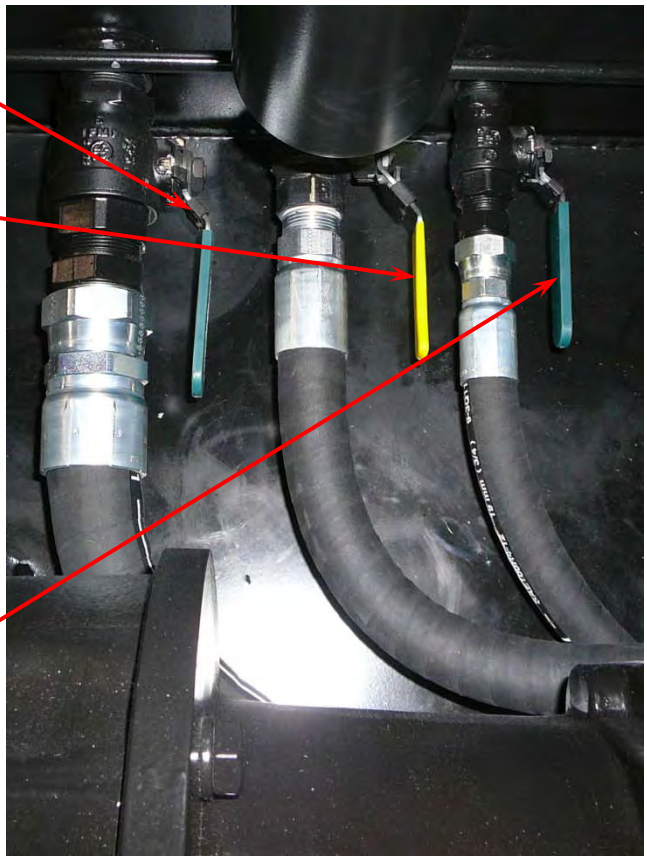


Suction Ball Valves – **SUCTION BALL VALVES MUST REMAIN IN THE OPEN POSITION DURING SYSTEM OPERATION !!!**

Stroker Pump Suction Ball Valve – (bom# 31)

Spindle Charge Pump Suction Ball Valve (bom# 30)

Tool Feed Suction Ball Valve (bom# 31)



Nameplate

THE NEXT GENERATION

Digital Display Proportional Valve Driver

Lynch™ Electronics
A Division of Lynch Fluid Controls

LE PDX
DIN rail mount

Features and Benefits

- Microcontroller design
- Independent adjustments (Incl. ramp up & ramp down)
- 4 digit extra bright seven segment LED display
- Large, easy-to-use adjustments and readout
- Display and adjust actual values (Current & Voltage)
- Wide range of supply voltage
- User selectable input type through menu setup (ex: 0 to 5V, 0 to 10V, 4 to 20mA, -10 to +10V)
- Wide ramp time range (0 to 99.5 Sec)
- Simple control with analog input, Locally supplied reference voltage
- Energy efficient PWM circuit/no heat sink required
- Current sensing maintains output regardless of changes in supply voltage and coil resistance
- Electronic limiting circuit/short circuit proof
- Reverse polarity, Command Input protection
- Load can be connected & disconnected live
- Mounting: DIN Rail
- Easy troubleshooting/cable length not an issue

LE PDX Standard Specifications

Operating voltage:	9 to 36 VDC
Maximum output current:	3.00Amps
Input signal:	5V, 10V, 4 to 20mA
Maximum ramp time:	99.5 Sec
PWM / Dither frequency:	40-450Hz
Linearity:	1%
Operating Temperature:	-40° to +80° Celsius

Several Forms Available

NEW

Note: Customization of functionality and enclosure type are available as per customer request.

PART NUMBER SYSTEM Proportional Solenoid Driver, Dual, DIN rail mount open PCB. **Example: LE PDX**

TYPE	MODEL	FORM	PARAMETERS = X
LE Lynch Electronics	P Proportional Solenoid Driver	D Dual, DIN rail mount open PCB	

COMMAND INPUT	0 to 5V, 0 to 10V, 4 to 20mA, - 10V to + 10V
MAX CURRENT OUTPUT	0.20 to 3.00A
RAMP TIME	0 to 99.5 Sec

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LE PDX
DIN rail mount

Lynch™ Electronics
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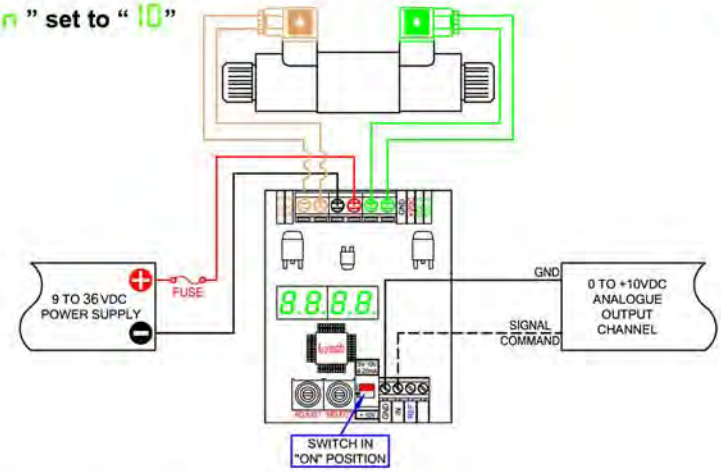
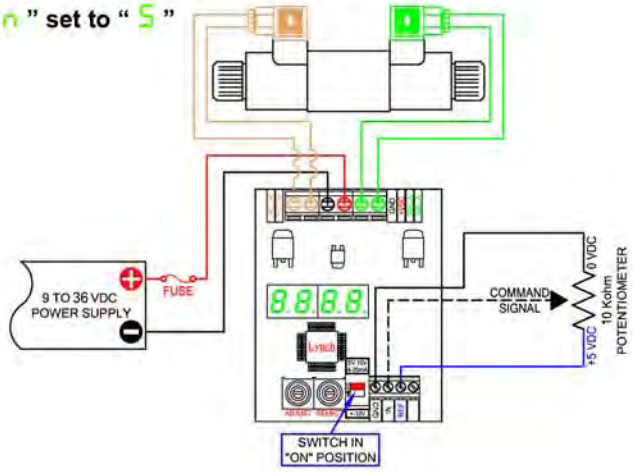
LE PDX SCHEMATICS

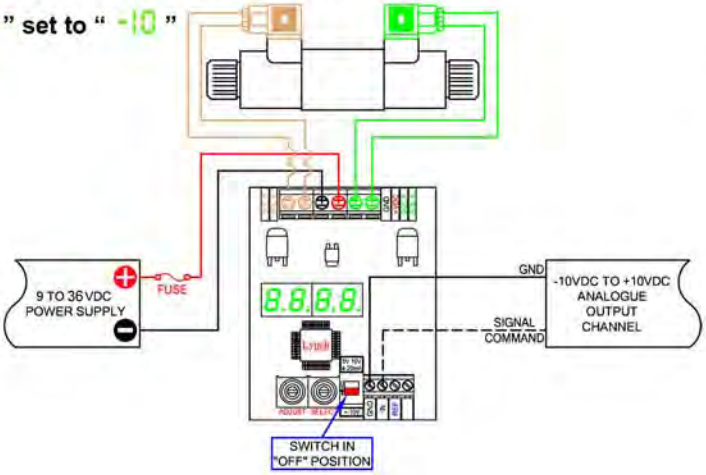
EXTERNAL INPUT SIGNAL CONNECTION
" in " set to " 10"



POTENTIOMETER CONNECTION
" in " set to " 5 "

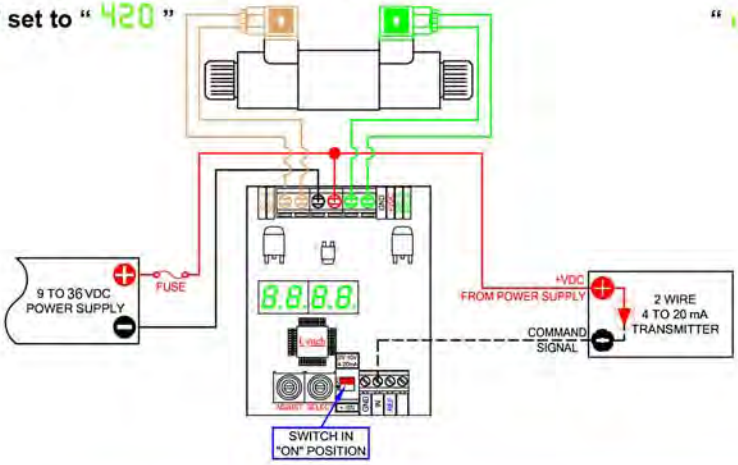


EXTERNAL INPUT SIGNAL CONNECTION
" in " set to " -10 "

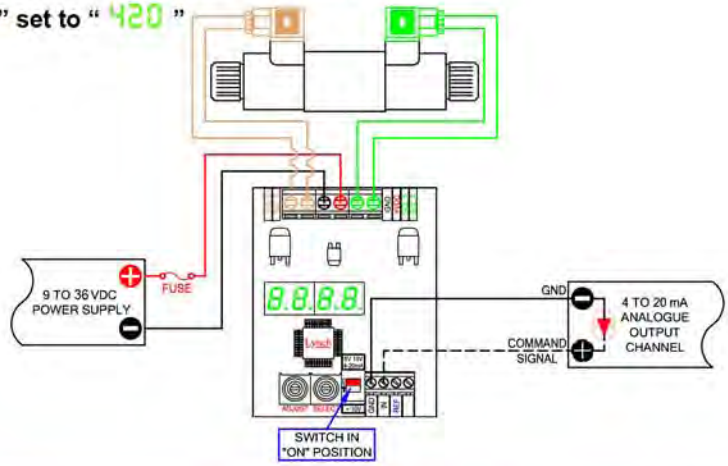


PLEASE NOTE: For "0 to 5 VDC" & "0 to 10 VDC" command input drivers, it is recommended to use independent negative conductors for power supply and analogue output channel (PLC/PC) to maintain command signal accuracy due to voltage drop on long cable runs.

TWO WIRE TRANSMITTER INPUT CONNECTION
" in " set to " 420 "



EXTERNAL INPUT SIGNAL CONNECTION
" in " set to " 420 "



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LE PDX
DIN rail mount

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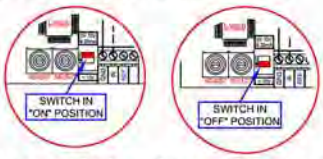
LE PDX SET-UP PROCEDURE

(NOTE: Prior to setting up parameters, you must select proper Input Signal setting for your system)

Available Input Signal options for Dual Solenoid Proportional Drivers

DIP Switch in ON/UP position
- in: 10 (0 to 10V) <=Default
- in: 5 (0 to 5V)
- in: 420 (4 to 20mA)



DIP Switch in OFF/DOWN position
- in: -10 (-10 to +10V) *Requires change in DIP switch setting to down position

Applying improper Input Signal to wrong setting on the Driver may be damaging to Driver Unit and may cause driver to fault to Error Status mode

SET-UP

1. At power up, the display will show either the output current signal or the input signal (Default display setting shows the output signal). The decimal point will be flashing.
2. Rotate SELECT to enter the set-up mode
3. When you reach the setting you want to modify, rotate ADJUST up or down to the desired value.
4. To modify another setting, rotate SELECT again and repeat.
5. The Driver is fully functional during the set-up procedure with any adjustments effective immediately.
6. In order to write the new settings in the memory and return to normal mode of operation, rotate SELECT until the display shows SA and then rotate ADJUST or wait for 100 seconds.
7. If you do not want to save the new settings you have just modified, you must disconnect the Driver from the power supply before the end of the 100 seconds to restore the previous settings.
8. After saving parameters to memory, the decimal point will be flashing and the Driver display will be back showing either the output current signal or input signal depending on your di selection.
9. To start over completely, you can restore the factory settings by rotating SELECT to rFP and then rotate ADJUST up past 10 for the display to reset. (NOTE for Step 9: You may have to adjust your Input Signal Setting again if you reset to factory settings.)

LE PDX SETTINGS & RANGE

A Hi: Solenoid A HIGH, Maximum Current Output, 0.20 to 3.00 [Amps]
A Lo: Solenoid A LOW, Minimum Current Output, 0.00 to 2.99 [Amps] (See: NOTE 1)
ArUP: Solenoid A RAMP UP, Time for Output to Increase from min to max, 0.0 to 99.5 [SEC]
Ardn: Solenoid A RAMP DOWN, Time for Output to decrease from max to min, 0.0 to 99.5 [SEC]
b Hi: Solenoid B HIGH, Maximum Current Output, 0.20 to 3.00 [Amps]
b Lo: Solenoid B LOW, Minimum Current Output 0.00 to 2.99 [Amps] (See: NOTE 1)
brUP: Solenoid B RAMP UP, Time for Output to Increase from min to max, 0.0 to 99.5 [SEC]
brdn: Solenoid B RAMP DOWN, Time for Output to decrease from max to min, 0.0 to 99.5 [SEC]
Cdb: COMMAND DEADBAND, Output disabled if command signal less than deadband, 0 to 5 [%]
JC: JOYSTICK CALIBRATION / INPUT OFFSET COMPENSATION, Adjusts the midpoint between solenoid A and B
  Midpoint at 50%, Range from 40 to 50 to 60 [%]
dFr: DITHER FREQUENCY, 40 (40Hz) to 450 (450Hz)
in: INPUT SIGNAL SELECTION, 5 (0 to 5V) or 10 (0 to 10V) or 420 (4 to 20mA) or -10 (-10 to +10V)
  Requires to change setting of Input DIP SWITCH
di: DISPLAYED SIGNAL FOR TROUBLESHOOTING 0 (command signal in [Volts] or [milliAmps]) or 1 (solenoid current in [Amps])
  Flashing decimal point is an indicator for present display mode
  - Fast Flashing decimal point, several flashes per second indicates di = 0
  - Slow Flashing decimal point, 1 per second indicates di = 1
  - No Flashing decimal point or No decimal point indicates display in SETTING/ADJUST mode
SA: SAVE SETTINGS
rFP: RESET FACTORY PARAMETERS (See: NOTE 2)
Err: ERROR DETECTION STATE, has 3 states
  Error 0 - No Errors
  Error 1 - Overcurrent in driver likely due to short circuit in Solenoid
  Error 2 - Current exceeding 20mA in "4 to 20mA" input mode
CLr: CLEAR ERROR, Clears Driver of Error State (See: NOTE 2)

NOTE 1: When adjusting the HI and LO parameters note the HI parameter value cannot be adjusted below the LO parameter value as well the LO parameter value cannot exceed the HI parameter value.

NOTE 2: Adjust Parameter Value up past 9 to operate this command setting

OPTIONAL FEATURES (Please contact us for more information)

Pcd: PASSWORD, Adjust code for Password Protection settings for Lock or Unlock
Loc: LOCK, Locks driver to LOCKED state with Password set in Pcd
UnL: UNLOCK, Unlocks driver with correct Password set in Pcd
Only available in LOCKED state mode

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FRACTION / DECIMAL / MILLIMETER EQUIVALENTS CHART

INCH FRACTION	INCH DECIMAL	MILLIMETER	INCH FRACTION	INCH DECIMAL	MILLIMETER	INCH FRACTION	INCH DECIMAL	MILLIMETER
. . . .	.003937	0,1000	9/32	.281250	7,1438	21/32	.656250	16,6688
. . . .	.007874	0,2000	19/64	.296875	7,5406	. . . .	.669291	17,0000
. . . .	.011811	0,3000	5/16	.312500	7,9375	43/64	.671875	17,0656
1/64	.015625	0,3969	. . . .	.314961	8,0000	11/16	.687500	17,4625
. . . .	.015748	0,4000	21/64	.328125	8,3344	45/64	.703125	17,8594
. . . .	.019685	0,5000	11/32	.343750	8,7313	. . . .	.708661	18,0000
. . . .	.023622	0,6000	. . . .	.354331	9,0000	23/32	.718750	18,2563
. . . .	.027559	0,7000	23/64	.359375	9,1281	47/64	.734375	18,6531
1/32	.031250	0,7938	3/8	.375000	9,5250	. . . .	.748031	19,0000
. . . .	.031496	0,8000	25/64	.390625	9,9219	3/4	.750000	19,0500
. . . .	.035433	0,9000	. . . .	.393701	10,0000	49/64	.765625	19,4469
. . . .	.039370	1,0000	13/32	.406250	10,3188	25/32	.781250	19,8438
3/64	.046875	1,1906	27/64	.421875	10,7156	. . . .	.787402	20,0000
1/16	.062500	1,5875	. . . .	.433071	11,0000	51/64	.796875	20,2406
5/64	.078125	1,9844	7/16	.437500	11,1125	13/16	.812500	20,6375
. . . .	.078740	2,0000	29/64	.453125	11,5094	. . . .	.826772	21,0000
3/32	.093750	2,3813	15/32	.468750	11,9063	53/64	.828125	21,0344
7/64	.109375	2,7781	. . . .	.472441	12,0000	27/32	.843750	21,4313
. . . .	.118110	3,0000	31/64	.484375	12,3031	55/64	.859375	21,8281
1/8	.125000	3,1750	1/2	.500000	12,7000	. . . .	.866142	22,0000
9/64	.140625	3,5719	. . . .	.511811	13,0000	7/8	.875000	22,2250
5/32	.156250	3,9688	33/64	.515625	13,0969	57/64	.890625	22,6219
. . . .	.157480	4,0000	17/32	.531250	13,4938	. . . .	.905512	23,0000
11/64	.171875	4,3656	35/64	.546875	13,8906	29/32	.906250	23,0188
3/16	.187500	4,7625	. . . .	.551181	14,0000	59/64	.921875	23,4156
. . . .	.196850	5,0000	9/16	.562500	14,2875	15/16	.937500	23,8125
13/64	.203125	5,1594	37/64	.578125	14,6844	. . . .	.944882	24,0000
7/32	.218750	5,5563	. . . .	.590551	15,0000	61/64	.953125	24,2094
15/64	.234375	5,9531	19/32	.593750	15,0813	31/32	.968750	24,6063
. . . .	.236220	6,0000	39/64	.609375	15,4781	. . . .	.984252	25,0000
1/4	.250000	6,3500	5/8	.625000	15,8750	63/64	.984375	25,0031
17/64	.265625	6,7469	. . . .	.629921	16,0000	1	1.000000	25,4000
. . . .	.275591	7,0000	41/64	.640625	16,2719	1-1/16	1.062500	26,9880

FORMULAS:

MULTIPLY		BY		TO GET
INCHES (in)	x	25.4	=	MILLIMETERS (mm)
FEET (ft)	x	0.3048	=	METERS (m)

MULTIPLY		BY		TO GET
MILLIMETERS (mm)	x	0.03937	=	INCHES (in)
METERS (m)	x	3.281	=	FEET (ft)

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